

SEQUENCE LISTING

<110> E. I. du Pont de Nemours and Company

<120> Membrane-Bound Desaturases

<130> BB1264

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<150> 60/110,784

<151> 1998-December-03

<160> 17

<170> Microsoft Office 97

<210> 1

<211> 1471

<212> DNA

<213> Picramnia pentandra

<220>

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<222> (1402)

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<211> 448

<212> PRT

<213> Picramnia pentandra

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 Ile Ser Lys Trp Thr Lys Glu His Pro Gly Gly Glu Leu Pro Leu Leu
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 Ser Phe Ala Gly Gln Asp Val Thr Asp Ala Phe Ile Ala Tyr His Pro
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 Gly Thr Ala Trp Gln Tyr Leu Asp Arg Phe Phe Thr Gly Tyr Tyr Val
 65 70 75 80
 Gln Asp Tyr Ser Val Ser Glu Met Ser Lys Asp Tyr Arg Arg Leu Val
 85 90 95
 Ser Glu Phe Ser Lys Met Gly Leu Phe Lys Thr Pro Gly Lys Gly Val
 100 105 110
 Tyr Cys Ser Ile Phe Phe Val Ser Val Leu Phe Ala Leu Ser Val Tyr
 115 120 125
 Gly Val Leu Tyr Cys Lys Ser Thr Trp Ala His Leu Cys Ser Gly Leu
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 Leu Met Gly Met Leu Trp Leu Gln Ser Gly Trp Val Gly His Asp Ser
 145 150 155 160
 Cys His Tyr Gln Val Met Pro Asn Arg Lys Leu Asn Arg Leu Phe Gln
 165 170 175
 Ile Ile Ala Gly Asn Val Ile Ala Gly Val Ser Val Ala Trp Trp Lys
 180 185 190
 Leu Asp His Asn Thr His His Phe Ala Cys Asn Ser Ala Asn Leu Asp
 195 200 205
 Pro Asp Ile Gln His Leu Pro Ile Ile Ala Ile Ser Pro Lys Phe Phe
 210 215 220
 Asn Ser Leu Thr Ser Tyr Tyr His Asn Cys Lys Met Thr Tyr Asp Arg
 225 230 235 240
 Ala Ala Arg Phe Phe Val Ser Phe Gln His Trp Thr Phe Tyr Pro Ala
 245 250 255
 Leu Leu Ser Val Arg Leu Tyr Leu Phe Ile Leu Ser Phe Lys Val Val
 260 265 270
 Phe Ser Asn Asn Lys Arg Val Tyr Lys Arg Ser Gln Glu Ile Leu Gly
 275 280 285
 Tyr Ala Ala Phe Leu Thr Trp Tyr Ser Leu Leu Leu Ser Arg Leu Pro
 290 295 300
 Asn Trp Pro Glu Arg Val Met Tyr Phe Thr Ser Cys Leu Ala Val Ala
 305 310 315 320

Gly Phe Gln His Trp Gln Phe Ser Leu Asn His Phe Ala Ser Asn Val
 325 330 335

Tyr Thr Gly Leu Pro Ser Gly Asn Asp Trp Phe His Gln Gln Thr Lys
 340 345 350

Gly Thr Leu Asn Ile Thr Ala Ser Ala Trp Trp Asp Trp Phe His Gly
 355 360 365

Gly Leu His Phe Gln Ile Glu His His Leu Phe Pro Arg Met Pro Lys
 370 375 380

Cys His Phe Arg Lys Ile Ser Pro Ile Val Asn Lys Leu Cys Gln Lys
 385 390 395 400

His Asn Leu Ser Tyr Glu Thr Ala Thr Met Trp Glu Ala Asn Lys Met
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Val Tyr Ser Thr Leu Arg Ala Val Ala Met Glu Ala Lys Asp Val Thr
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 <213> Zea mays

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 <213> Zea mays

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 35 40 45
 Thr Pro Trp Leu Pro His His Pro Gly Gly Asp Leu Pro Leu Leu Thr
 50 55 60
 Leu Ala Gly Gln Asp Ala Thr Asp Ala Phe Ala Ala Tyr His Pro Pro
 65 70 75 80
 Ser Ala Arg Pro Leu Leu Arg Arg Phe Phe Val Gly Arg Leu Ser Asp
 85 90 95
 Tyr Ala Val Ser Pro Ala Ser Ala Asp Tyr Arg Arg Leu Leu Ala Gln
 100 105 110
 Leu Ser Ser Ala Gly Leu Phe Glu Arg Val Gly Pro Thr Pro Lys Val
 115 120 125
 Gln Leu Val Leu Met Ala Val Leu Phe Tyr Ala Ala Leu Tyr Leu Val
 130 135 140
 Leu Ala Cys Ala Ser Ala Trp Ala His Leu Leu Ala Gly Gly Leu Ile
 145 150 155 160
 Gly Phe Val Trp Ile Gln Ser Gly Trp Met Gly His Asp Ser Gly His
 165 170 175
 His Arg Ile Thr Gly His Pro Val Leu Asp Arg Val Val Gln Val Leu
 180 185 190
 Ser Gly Asn Cys Leu Thr Gly Leu Ser Ile Ala Trp Trp Lys Cys Asn
 195 200 205
 His Asn Thr His His Ile Ala Cys Asn Ser Leu Asp His Asp Pro Asp
 210 215 220
 Leu Gln His Met Pro Leu Phe Ala Val Ser Pro Lys Leu Phe Gly Asn
 225 230 235 240
 Ile Trp Ser Tyr Phe Tyr Gln Arg Thr Leu Ala Phe Asp Ala Ala Ser
 245 250 255
 Lys Phe Phe Ile Ser Tyr Gln His Trp Thr Phe Tyr Pro Val Met Cys
 260 265 270

Ile Ala Arg Ile Asn Leu Leu Ala Gln Ser Ala Leu Phe Val Leu Thr
 275 280 285

Glu Lys Arg Val Pro Gln Arg Leu Leu Glu Ile Ala Gly Val Ala Thr
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Phe Trp Ala Trp Tyr Pro Leu Leu Val Ala Ser Leu Pro Asn Trp Trp
 305 310 315 320

Glu Arg Val Ala Phe Val Leu Phe Ser Phe Thr Ile Cys Gly Ile Gln
 325 330 335

His Val Gln Phe Cys Leu Asn His Phe Ser Ser Asp Val Tyr Val Gly
 340 345 350

Pro Pro Lys Gly Asn Asp Trp Phe Glu Lys Gln Thr Ala Gly Thr Leu
 355 360 365

Asp Ile Leu Cys Ser Pro Trp Met Asp Trp Phe His Gly Gly Leu Gln
 370 375 380

Phe Gln Ile Glu His His Leu Phe Pro Arg Leu Pro Arg Cys His Leu
 385 390 395 400

Arg Lys Val Ala Pro Ala Val Arg Asp Leu Cys Lys Lys His Gly Leu
 405 410 415

Thr Tyr Ser Ala Ala Thr Phe Trp Gly Ala Asn Val Leu Thr Trp Lys
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Thr Leu Arg Ala Ala Ala Leu Gln Ala Arg Thr Ala Thr Ser Gly Gly
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 <212> PRT
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 35 40 45
 Ile Leu Thr Leu Phe Pro Leu Ser Val Cys Gly Val Leu Phe Ser Asp
 50 55 60
 Ser Thr Phe Val His Val Leu Ser Ala Ala Leu Ile Gly Phe Leu Trp
 65 70 75 80
 Ile Gln Ser Gly Trp Ile Gly His Asp Ser Gly His Tyr Asn Val Met
 85 90 95
 Leu Ser Arg Arg Leu Asn Arg Ala Ile Gln Ile Leu Ser Gly Asn Ile
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 Leu Ala Gly Ile Ser Ile Gly Trp Trp Lys Trp Asn His Asn Ala His
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Pro Val Phe Ala Val Ser Ser Arg Phe Phe Asn Ser Ile Thr Ser His
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 165 170 175
 Cys Tyr Gln His Phe Thr Phe Tyr Pro Val Met Cys Val Ala Arg Val
 180 185 190
 Asn Leu Tyr Leu Gln Thr Ile Leu Leu Leu Phe Ser Arg Xaa Lys Val
 195 200 205
 Gln Asp Arg Ala Leu Asn Ile Met Gly Ile Leu Val Phe Trp Thr Trp
 210 215 220
 Phe Leu Phe Leu Leu Ala Leu Leu Phe Val Pro Ile Gln His Ile Gln
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 <212> DNA
 <213> Glycine max

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 acaaatcat atcatgtatg ccaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1920
 aaaaaaaaaa aaaa 1934

<210> 8
 <211> 450
 <212> PRT
 <213> Glycine max

<400> 8
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 35 40 45
 Pro Ile Ser Asn Leu Ala Gly Gln Asp Val Thr Asp Ala Phe Ile Ala
 50 55 60
 Tyr His Pro Gly Thr Ala Trp Ser His Leu Glu Lys Phe Phe Thr Gly
 65 70 75 80
 Tyr His Leu Ser Asp Phe Lys Val Ser Glu Val Ser Lys Asp Tyr Arg
 85 90 95
 Lys Leu Ala Ser Glu Phe Ser Lys Leu Gly Leu Phe Asp Thr Lys Gly
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 115 120 125
 Val Leu Tyr Gly Val Leu Arg Cys Thr Ser Val Trp Ala His Leu Gly
 130 135 140
 Ser Gly Met Leu Leu Gly Leu Leu Trp Met Gln Ser Ala Tyr Val Gly
 145 150 155 160
 His Asp Ser Gly His Tyr Val Val Met Thr Thr Asn Gly Phe Asn Lys
 165 170 175
 Val Ala Gln Ile Leu Ser Gly Asn Cys Leu Thr Gly Ile Ser Ile Ala
 180 185 190
 Trp Trp Lys Trp Thr His Asn Ala His His Ile Ala Cys Asn Ser Leu
 195 200 205
 Asp His Asp Pro Asp Leu Gln His Met Pro Val Phe Ala Val Ser Ser
 210 215 220
 Arg Phe Phe Asn Ser Ile Thr Ser His Phe Tyr Gly Arg Lys Leu Glu
 225 230 235 240
 Phe Asp Phe Ile Ala Arg Phe Leu Ile Cys Tyr Gln His Phe Thr Phe
 245 250 255
 Tyr Pro Val Met Cys Val Ala Arg Val Asn Leu Tyr Leu Gln Thr Ile
 260 265 270
 Leu Leu Leu Phe Ser Arg Arg Lys Val Gln Asp Arg Ala Leu Asn Ile
 275 280 285

Met Gly Ile Leu Val Phe Trp Thr Trp Phe Pro Leu Leu Val Ser Cys
 290 295 300

Leu Pro Asn Trp Pro Glu Arg Val Met Phe Val Leu Ala Ser Phe Ala
 305 310 315 320

Val Cys Ser Ile Gln His Ile Gln Phe Cys Leu Asn His Phe Ala Ala
 325 330 335

Asn Val Tyr Val Gly Pro Pro Ser Gly Asn Asp Trp Phe Glu Lys Gln
 340 345 350

Thr Ser Gly Thr Leu Asp Ile Ser Cys Ala Ser Ser Met Asp Trp Phe
 355 360 365

Phe Gly Gly Leu Gln Phe Gln Leu Glu His His Leu Phe Pro Arg Leu
 370 375 380

Pro Arg Cys Gln Leu Arg Lys Ile Ser Pro Leu Val Ser Asp Leu Cys
 385 390 395 400

Lys Lys His Asn Leu Pro Tyr Arg Ser Leu Ser Phe Trp Glu Ala Asn
 405 410 415

Gln Trp Thr Ile Arg Thr Leu Arg Thr Ala Ala Leu Gln Ala Arg Asp
 420 425 430

Leu Thr Asn Pro Ala Pro Lys Asn Leu Leu Trp Glu Ala Val Asn Thr
 435 440 445

His Gly
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- <210> 9
- <211> 1972
- <212> DNA
- <213> Triticum aestivum

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 acggggattc agcatgttca gttctgctg aaccacttct catccgctgt gtatgttggg 1200

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cctcgectgc ctcgctgcca ctataggatg gtgcgcgccga ttgtgctgga cctttgcaag 1380
aagcatgggc tgtcttatgg tgccgccaca ttctgggagg caaatgtaat gacatggaag 1440
acgctaaggg ctgcagcatt gcaggccagg gaagccacta ctggagctgc tccaaagaat 1500
ctgggtctggg aagctttgaa cactcatgga tgactgggat caggactgga gtatgagaca 1560
attgtaagcg tcgagccttg cgtgcatgca gttatctgat tgcttctcga ttgctgtagag 1620
atattgatcc ttttagctgt tggaaatcgt ttggattttt cgtgttgcca ggtgactatc 1680
tttgcagttc aatcgtgggt tcatgcttca gttgtgtact tgtacaccat atttagattg 1740
ttgggttctc cctatcatgg taactacatc aatagtactt gatttacatc ataaaaatccg 1800
tggcttatct ttacatccat ttcattttgc ttgcaagttc atgaaactgt aaactcaatt 1860
gatggtttgt agcgtgtata tctgtctgct atggcagctt gaactgcatt ttgggaacat 1920
gacgattcca ataataaacg tttagacatt ttctaaaaaa aaaaaaaaaa aa 1972
    
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<210> 10
<211> 469
<212> PRT
<213> Triticum aestivum
    
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<400> 10

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Met Ala Arg Thr Gly Leu Ala Asp Ala Thr Ala Pro Glu Ala Asp Ala
 1           5           10           15
Met Pro Ala Ala Ser Lys Asp Ala Ala Asp Val Arg Met Ile Ser Thr
           20           25           30
Lys Glu Leu Gln Ala His Ala Ala Ala Asp Asp Leu Trp Ile Ser Ile
           35           40           45
Ser Gly Asp Val Tyr Asp Val Thr Pro Trp Leu Arg His His Pro Gly
           50           55           60
Gly Glu Val Pro Leu Ile Thr Leu Ala Gly Gln Asp Ala Thr Asp Ala
           65           70           75           80
Phe Met Ala Tyr His Pro Pro Ser Val Arg Pro Leu Leu Arg Arg Phe
           85           90           95
Phe Val Gly Arg Leu Ser Asp Tyr Thr Val Pro Pro Ala Ser Ala Asp
           100          105          110
Phe Arg Arg Leu Leu Ala Gln Leu Ser Ser Ala Gly Leu Phe Glu Arg
           115          120          125
Val Gly His Thr Pro Lys Phe Leu Leu Val Ala Met Ser Val Leu Phe
           130          135          140
Cys Ile Ala Leu Tyr Cys Val Leu Ala Cys Ser Ser Thr Gly Ala His
           145          150          155          160
Met Phe Ala Gly Gly Leu Ile Gly Phe Ile Trp Ile Gln Ser Gly Trp
           165          170          175
Ile Gly His Asp Ser Gly His His Gln Ile Thr Arg His Pro Ala Leu
           180          185          190
Asn Arg Leu Leu Gln Val Val Ser Gly Asn Cys Leu Thr Gly Leu Gly
           195          200          205
    
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Ile Ala Trp Trp Lys Phe Asn His Asn Thr His His Ile Ser Cys Asn
 210 215 220

Ser Leu Asp His Asp Pro Asp Leu Gln His Leu Pro Leu Phe Ala Val
 225 230 235 240

Ser Thr Lys Leu Phe Asn Asn Leu Trp Ser Val Cys Tyr Glu Arg Thr
 245 250 255

Leu Ala Phe Asp Ala Ile Ser Lys Phe Phe Val Ser Tyr Gln His Trp
 260 265 270

Thr Phe Tyr Pro Val Met Gly Phe Ala Arg Ile Asn Leu Leu Val Gln
 275 280 285

Ser Ile Val Phe Leu Ile Thr Gln Lys Lys Val Arg Gln Arg Trp Leu
 290 295 300

Glu Ile Ala Gly Val Ala Ala Phe Trp Val Trp Tyr Pro Leu Leu Val
 305 310 315 320

Ser Cys Leu Pro Asn Trp Trp Glu Arg Val Ala Phe Val Leu Ala Ser
 325 330 335

Phe Val Ile Thr Gly Ile Gln His Val Gln Phe Cys Leu Asn His Phe
 340 345 350

Ser Ser Ala Val Tyr Val Gly Pro Pro Lys Gly Asn Asp Trp Phe Glu
 355 360 365

Arg Gln Thr Ala Gly Thr Leu Asp Ile Lys Cys Ser Pro Trp Met Asp
 370 375 380

Trp Phe His Gly Gly Leu Gln Phe Gln Val Glu His His Leu Phe Pro
 385 390 395 400

Arg Leu Pro Arg Cys His Tyr Arg Met Val Ala Pro Ile Val Arg Asp
 405 410 415

Leu Cys Lys Lys His Gly Leu Ser Tyr Gly Ala Ala Thr Phe Trp Glu
 420 425 430

Ala Asn Val Met Thr Trp Lys Thr Leu Arg Ala Ala Ala Leu Gln Ala
 435 440 445

Arg Glu Ala Thr Thr Gly Ala Ala Pro Lys Asn Leu Val Trp Glu Ala
 450 455 460

Leu Asn Thr His Gly
 465

<210> 11
 <211> 448
 <212> PRT
 <213> Borago officinalis

<400> 11
 Met Ala Ala Gln Ile Lys Lys Tyr Ile Thr Ser Asp Glu Leu Lys Asn
 1 5 10 15

His Asp Lys Pro Gly Asp Leu Trp Ile Ser Ile Gln Gly Lys Ala Tyr
 20 25 30
 Asp Val Ser Asp Trp Val Lys Asp His Pro Gly Gly Ser Phe Pro Leu
 35 40 45
 Lys Ser Leu Ala Gly Gln Glu Val Thr Asp Ala Phe Val Ala Phe His
 50 55 60
 Pro Ala Ser Thr Trp Lys Asn Leu Asp Lys Phe Phe Thr Gly Tyr Tyr
 65 70 75 80
 Leu Lys Asp Tyr Ser Val Ser Glu Val Ser Lys Asp Tyr Arg Lys Leu
 85 90 95
 Val Phe Glu Phe Ser Lys Met Gly Leu Tyr Asp Lys Lys Gly His Ile
 100 105 110
 Met Phe Ala Thr Leu Cys Phe Ile Ala Met Leu Phe Ala Met Ser Val
 115 120 125
 Tyr Gly Val Leu Phe Cys Glu Gly Val Leu Val His Leu Phe Ser Gly
 130 135 140
 Cys Leu Met Gly Phe Leu Trp Ile Gln Ser Gly Trp Ile Gly His Asp
 145 150 155 160
 Ala Gly His Tyr Met Val Val Ser Asp Ser Arg Leu Asn Lys Phe Met
 165 170 175
 Gly Ile Phe Ala Ala Asn Cys Leu Ser Gly Ile Ser Ile Gly Trp Trp
 180 185 190
 Lys Trp Asn His Asn Ala His His Ile Ala Cys Asn Ser Leu Glu Tyr
 195 200 205
 Asp Pro Asp Leu Gln Tyr Ile Pro Phe Leu Val Val Ser Ser Lys Phe
 210 215 220
 Phe Gly Ser Leu Thr Ser His Phe Tyr Glu Lys Arg Leu Thr Phe Asp
 225 230 235 240
 Ser Leu Ser Arg Phe Phe Val Ser Tyr Gln His Trp Thr Phe Tyr Pro
 245 250 255
 Ile Met Cys Ala Ala Arg Leu Asn Met Tyr Val Gln Ser Leu Ile Met
 260 265 270
 Leu Leu Thr Lys Arg Asn Val Ser Tyr Arg Ala His Glu Leu Leu Gly
 275 280 285
 Cys Leu Val Phe Ser Ile Trp Tyr Pro Leu Leu Val Ser Cys Leu Pro
 290 295 300
 Asn Trp Gly Glu Arg Ile Met Phe Val Ile Ala Ser Leu Ser Val Thr
 305 310 315 320
 Gly Met Gln Gln Val Gln Phe Ser Leu Asn His Phe Ser Ser Ser Val
 325 330 335

Tyr Val Gly Lys Pro Lys Gly Asn Asn Trp Phe Glu Lys Gln Thr Asp
 340 345 350

Gly Thr Leu Asp Ile Ser Cys Pro Pro Trp Met Asp Trp Phe His Gly
 355 360 365

Gly Leu Gln Phe Gln Ile Glu His His Leu Phe Pro Lys Met Pro Arg
 370 375 380

Cys Asn Leu Arg Lys Ile Ser Pro Tyr Val Ile Glu Leu Cys Lys Lys
 385 390 395 400

His Asn Leu Pro Tyr Asn Tyr Ala Ser Phe Ser Lys Ala Asn Glu Met
 405 410 415

Thr Leu Arg Thr Leu Arg Asn Thr Ala Leu Gln Ala Arg Asp Ile Thr
 420 425 430

Lys Pro Leu Pro Lys Asn Leu Val Trp Glu Ala Leu His Thr His Gly
 435 440 445

<210> 12
 <211> 469
 <212> PRT
 <213> Triticum aestivum

<400> 12
 Met Ala Arg Thr Gly Leu Ala Asp Ala Thr Ala Pro Glu Ala Asp Ala
 1 5 10 15

Met Pro Ala Ala Ser Lys Asp Ala Ala Asp Val Arg Met Ile Ser Thr
 20 25 30

Lys Glu Leu Gln Ala His Ala Ala Ala Asp Asp Leu Trp Ile Ser Ile
 35 40 45

Ser Gly Asp Val Tyr Asp Val Thr Pro Trp Leu Arg His His Pro Gly
 50 55 60

Gly Glu Val Pro Leu Ile Thr Leu Ala Gly Gln Asp Ala Thr Asp Ala
 65 70 75 80

Phe Met Ala Tyr His Pro Pro Ser Val Arg Pro Leu Leu Arg Arg Phe
 85 90 95

Phe Val Gly Arg Leu Thr Asp Tyr Thr Val Pro Pro Ala Ser Ala Asp
 100 105 110

Phe Arg Arg Leu Leu Ala Gln Leu Ser Ser Ala Gly Leu Phe Glu Arg
 115 120 125

Val Gly His Thr Pro Lys Phe Leu Leu Val Ala Met Ser Val Leu Phe
 130 135 140

Cys Ile Ala Leu Tyr Cys Val Leu Ala Cys Ser Ser Thr Gly Ala His
 145 150 155 160

Met Phe Ala Gly Gly Leu Ile Gly Phe Ile Trp Ile Gln Ser Gly Trp
 165 170 175

Ile Gly His Asp Ser Gly His His Gln Ile Thr Arg His Pro Ala Leu
 180 185 190
 Asn Arg Leu Leu Gln Val Val Ser Gly Asn Cys Leu Thr Gly Leu Gly
 195 200 205
 Ile Ala Trp Trp Lys Phe Asn His Asn Thr His His Ile Ser Cys Asn
 210 215 220
 Ser Leu Asp His Asp Pro Asp Leu Gln His Leu Pro Leu Phe Ala Val
 225 230 235 240
 Ser Thr Lys Leu Phe Asn Asn Leu Trp Ser Val Cys Tyr Glu Arg Thr
 245 250 255
 Leu Ala Phe Asp Ala Ile Ser Lys Phe Phe Val Ser Tyr Gln His Trp
 260 265 270
 Thr Phe Tyr Pro Val Met Gly Phe Ala Arg Ile Asn Leu Leu Val Gln
 275 280 285
 Ser Ile Val Phe Leu Ile Thr Gln Lys Lys Val Arg Gln Arg Trp Leu
 290 295 300
 Glu Ile Ala Gly Val Ala Ala Phe Trp Val Trp Tyr Pro Leu Leu Val
 305 310 315 320
 Ser Cys Leu Pro Asn Trp Trp Glu Arg Val Ala Phe Val Leu Ala Ser
 325 330 335
 Phe Val Ile Thr Gly Ile Gln His Val Gln Phe Cys Leu Asn His Phe
 340 345 350
 Ser Ser Ala Val Tyr Val Gly Pro Pro Lys Gly Asn Asp Trp Phe Glu
 355 360 365
 Arg Gln Thr Ala Gly Thr Leu Asp Ile Lys Cys Ser Pro Trp Met Asp
 370 375 380
 Trp Phe His Gly Gly Leu Gln Phe Gln Val Glu His His Leu Phe Pro
 385 390 395 400
 Arg Leu Pro Arg Cys His Tyr Arg Met Val Ala Pro Ile Val Arg Asp
 405 410 415
 Leu Cys Lys Lys His Gly Leu Ser Tyr Gly Ala Ala Thr Phe Trp Glu
 420 425 430
 Ala Asn Val Met Thr Trp Lys Thr Leu Arg Ala Ala Ala Leu Gln Ala
 435 440 445
 Arg Glu Ala Thr Thr Gly Ala Ala Pro Lys Asn Leu Val Trp Glu Ala
 450 455 460
 Leu Asn Thr His Gly
 465

<210> 13

<211> 458

<212> PRT

<213> Helianthus annuus

<400> 13

Met Val Ser Pro Ser Ile Glu Val Leu Asn Ser Ile Ala Asp Gly Lys
 1 5 10 15
 Lys Tyr Ile Thr Ser Lys Glu Leu Lys Lys His Asn Asn Pro Asn Asp
 20 25 30
 Leu Trp Ile Ser Ile Leu Gly Lys Val Tyr Asn Val Thr Glu Trp Ala
 35 40 45
 Lys Glu His Pro Gly Gly Asp Ala Pro Leu Ile Asn Leu Ala Gly Gln
 50 55 60
 Asp Val Thr Asp Ala Phe Ile Ala Phe His Pro Gly Thr Ala Trp Lys
 65 70 75 80
 His Leu Asp Lys Leu Phe Thr Gly Tyr His Leu Lys Asp Tyr Gln Val
 85 90 95
 Ser Asp Ile Ser Arg Asp Tyr Arg Lys Leu Ala Ser Glu Phe Ala Lys
 100 105 110
 Ala Gly Met Phe Glu Lys Lys Gly His Gly Val Ile Tyr Ser Leu Cys
 115 120 125
 Phe Val Ser Leu Leu Leu Ser Ala Cys Val Tyr Gly Val Leu Tyr Ser
 130 135 140
 Gly Ser Phe Trp Ile His Met Leu Ser Gly Ala Ile Leu Gly Leu Ala
 145 150 155 160
 Trp Met Gln Ile Ala Tyr Leu Gly His Asp Ala Gly His Tyr Gln Met
 165 170 175
 Met Ala Thr Arg Gly Trp Asn Lys Phe Ala Gly Ile Phe Ile Gly Asn
 180 185 190
 Cys Ile Thr Gly Ile Ser Ile Ala Trp Trp Lys Trp Thr His Asn Ala
 195 200 205
 His His Ile Ala Cys Asn Ser Leu Asp Tyr Asp Pro Asp Leu Gln His
 210 215 220
 Leu Pro Met Leu Ala Val Ser Ser Lys Leu Phe Asn Ser Ile Thr Ser
 225 230 235 240
 Val Phe Tyr Gly Arg Gln Leu Thr Phe Asp Pro Leu Ala Arg Phe Phe
 245 250 255
 Val Ser Tyr Gln His Tyr Leu Tyr Tyr Pro Ile Met Cys Val Ala Arg
 260 265 270
 Val Asn Leu Tyr Leu Gln Thr Ile Leu Leu Leu Ile Ser Lys Arg Lys
 275 280 285
 Ile Pro Asp Arg Gly Leu Asn Ile Leu Gly Thr Leu Ile Phe Trp Thr
 290 295 300

Trp Phe Pro Leu Leu Val Ser Arg Leu Pro Asn Trp Pro Glu Arg Val
 305 310 315 320

Ala Phe Val Leu Val Ser Phe Cys Val Thr Gly Ile Gln His Ile Gln
 325 330 335

Phe Thr Leu Asn His Phe Ser Gly Asp Val Tyr Val Gly Pro Pro Lys
 340 345 350

Gly Asp Asn Trp Phe Glu Lys Gln Thr Arg Gly Thr Ile Asp Ile Ala
 355 360 365

Cys Ser Ser Trp Met Asp Trp Phe Phe Gly Gly Leu Gln Phe Gln Leu
 370 375 380

Glu His His Leu Phe Pro Arg Leu Pro Arg Cys His Leu Arg Ser Ile
 385 390 395 400

Ser Pro Ile Cys Arg Glu Leu Cys Lys Lys Tyr Asn Leu Pro Tyr Val
 405 410 415

Ser Leu Ser Phe Tyr Asp Ala Asn Val Thr Thr Leu Lys Thr Leu Arg
 420 425 430

Thr Ala Ala Leu Gln Ala Arg Asp Leu Thr Asn Pro Ala Pro Gln Asn
 435 440 445

Leu Ala Trp Glu Ala Phe Asn Thr His Gly
 450 455

<210> 14
 <211> 38
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Definition of Artificial Sequence: PCR primer for 5' of pk0011.d5

<400> 14 35
 tttgcggccg caaatcaatg gaagaagcaa agaag

<210> 15
 <211> 33
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Definition of Sequence: antisense PCR primer for 3' of pk0011.d5

<400> 15 33
 tttgcggccg ccaggattca cccgaaagtg ttc

<210> 16
 <211> 823
 <212> DNA
 <213> Triticum aestivum

<220>
 <221> unsure
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<220>
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<220>
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 <222> (777)

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 <222> (807)

<400> 16
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 cttcctcctg agtcctgaac acccctcctc gcgctccagc taaatccacg ccaccgatgg 120
 cccgcacggg cttcgcggac gcaacggcgc cgaagccga cgcaatgccg gccgccagca 180
 aggacgccgc cgacgtccgc atgatctcca ccaaggagct gcaggcgcac gccgccgcgg 240
 acgacctctg gatctccatc tccggggacg tctacgacgt cacgccttgg ctgcccacc 300
 acccgggcgg cgaggtcccg ctcattcacc tcgcccgcga ggacgccacc gacgccttca 360
 tggcctacca cccgccctcc gtgcgcccgc tctccgcgg cttcttcgtc ggccgcctca 420

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ccgactacac tgtcccccc gctccgccc acttccgccc cctcctcgcg cagctctcct 480
ccgcgggctt cttcgagcgc gtcggcacac cccaagtcc ctgctcgtcg caaagtcngt 540
gctcttctgc atcggcctct actgctcctc gcttgcctca caccggggcc acatgttcgc 600
cgggggctca ttggcttata tggtcagtcg ggctggattg gcatactccg gcacacaaat 660
cacaggcacc tgcctcaacg ctctgnagtg gctcgggaat gctnacggct cggatcncgt 720
gggagtnanc acacaanaca nattctgaan ngtcacatac ctgactcana ttccgtntcg 780
ggtcacaagt ctaaaacttg catcgtnaag acttggttag cat 823
    
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<210> 17
<211> 114
<212> PRT
<213> Triticum aestivum
    
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<400> 17
Met Pro Ala Ala Ser Lys Asp Ala Ala Asp Val Arg Met Ile Ser Thr
  1          5          10          15
Lys Glu Leu Gln Ala His Ala Ala Ala Asp Asp Leu Trp Ile Ser Ile
      20          25          30
Ser Gly Asp Val Tyr Asp Val Thr Pro Trp Leu Arg His His Pro Gly
      35          40          45
Gly Glu Val Pro Leu Ile Thr Leu Ala Gly Gln Asp Ala Thr Asp Ala
      50          55          60
Phe Met Ala Tyr His Pro Pro Ser Val Arg Pro Leu Leu Arg Arg Phe
      65          70          75          80
Phe Val Gly Arg Leu Thr Asp Tyr Thr Val Pro Pro Ala Ser Ala Asp
      85          90          95
Phe Arg Arg Leu Leu Ala Gln Leu Ser Ser Ala Gly Leu Phe Glu Arg
      100          105          110
Val Gly
    
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